

**AMENDMENTS TO THE CLAIMS**

1. (Original) A nitride semiconductor LED, comprising:
- a substrate;
  - a GaN-based buffer layer formed on the substrate;
  - $\text{Al}_y\text{Ga}_{1-y}\text{N}/\text{GaN}$  short period superlattice (SPS) layers formed on the GaN-based buffer layer in a sandwich structure of upper and lower layers having an undoped GaN layer or an indium-doped GaN layer interposed therebetween (~~where,  $0 \leq y \leq 1$~~ ) (where  $0 < y \leq 1$ );
  - a first electrode layer of an n-GaN layer formed on the upper  $\text{Al}_y\text{Ga}_{1-y}\text{N}/\text{GaN}$  SPS layer;
  - an active layer formed on the first electrode layer; and
  - a second electrode layer of a p-GaN layer formed on the active layer.
2. (Currently Amended) The nitride semiconductor LED of claim 1, wherein the GaN-based buffer layer has a triple-structured  ~~$\text{Al}_y\text{In}_x\text{Ga}_{1-x-y}\text{N}/\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$~~   $\text{Al}_y\text{In}_x\text{Ga}_{1-(x+y)}\text{N}/\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$  laminated (~~Here, where  $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$~~ ), a double-structured  $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$  laminated (~~Here, where  $0 \leq x \leq 1$~~ ), or a super-lattice-structured (SLS)  $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$  laminated (~~Here, where  $0 \leq x \leq 1$~~ ).
3. (Original) The nitride semiconductor LED of claim 1, further comprising the undoped GaN layer or the indium-doped GaN layer on the GaN-based buffer layer.
4. (Currently Amended) A nitride semiconductor LED, comprising:

a substrate;

a GaN-based buffer layer formed on the substrate;

an undoped GaN layer or an indium-doped GaN layer formed on the GaN-based buffer layer;

$\text{Al}_y\text{Ga}_{1-y}\text{N}/\text{GaN}$  short period superlattice (SPS) layers formed on the undoped GaN layer or the indium-doped GaN layer, in a sandwich structure of upper and lower layers having the undoped GaN layer or the indium-doped GaN layer interposed therebetween (~~Here,  $0 \leq y \leq 1$~~ ) (where  $0 < y \leq 1$ );

a first electrode layer of an  $n^+$ -GaN layer formed on the upper  $\text{Al}_y\text{Ga}_{1-y}\text{N}/\text{GaN}$  SPS layer and containing a high concentration of dopants;

an n-GaN layer formed on the first electrode layer and containing a low concentration of dopants;

an active layer formed on the n-GaN layer; and

a second electrode layer of a p-GaN layer formed on the active layer.

5. (Currently Amended) The nitride semiconductor LED of claim 4, wherein the GaN-based buffer layer has a triple-structured  ~~$\text{Al}_y\text{In}_x\text{Ga}_{1-x-y}\text{N}/\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$~~   $\text{Al}_y\text{In}_x\text{Ga}_{1-(x+y)}\text{N}/\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$  laminated (~~Here, where  $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$~~ ), a double-structured  $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$  laminated (~~Here, where  $0 \leq x \leq 1$~~ ), or a super-lattice-structured (SLS)  $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$  laminated (~~Here, where  $0 \leq x \leq 1$~~ ).

6. (Original) A nitride semiconductor LED, comprising:

- a substrate;
- a GaN-based buffer layer formed on the substrate;
- a first electrode layer of an  $n^+$ -GaN layer formed on the GaN-based buffer layer and containing a high concentration of dopants;
- an n-GaN layer formed on the first electrode layer and containing a low concentration of dopants;
- an active layer formed on the n-GaN layer; and
- a second electrode layer of a p-GaN layer formed on the active layer.

7. (Original) The nitride semiconductor LED of claim 6, wherein the dopant concentration of the  $n^+$ -GaN layer is more than  $1 \times 10^{18}/\text{cm}^3$ .

8. (Original) The nitride semiconductor LED of claim 6, wherein the dopant concentration of the n-GaN layer is less than  $1 \times 10^{18}/\text{cm}^3$ .

9. (Original) The nitride semiconductor LED of claim 6, wherein the dopant concentration of the n-GaN layer is  $1 \times 10^{17}/\text{cm}^3$ .

10. (Currently Amended) The nitride semiconductor LED of claim 6, wherein the GaN-based buffer layer has a triple-structured  $\text{Al}_y\text{In}_x\text{Ga}_{1-x-y}\text{N}/\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$   $\text{Al}_y\text{In}_x\text{Ga}_{1-(x+y)}\text{N}/\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$  laminated (~~Here,~~ where  $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ), a double-structured  $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$

laminated (~~Here, where~~,  $0 \leq x \leq 1$ ), or a super-lattice-structured (SLS)  $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$  laminated (~~Here, where~~  $0 \leq x \leq 1$ ).

11. (Currently Amended) The nitride semiconductor LED of claim 6, further comprising  $\text{Al}_y\text{Ga}_{1-y}\text{N}/\text{GaN}$  short period superlattice (SPS) layers formed on the GaN-based buffer layer in a sandwich structure of upper and lower parts having an undoped GaN layer or an indium-doped GaN layer interposed therebetween (~~Here,  $0 \leq y \leq 1$~~ ) (where  $0 < y \leq 1$ ).

12. (Currently Amended) A fabrication method of a nitride semiconductor LED, the method comprising the steps of:

growing-up a GaN-based buffer layer on a substrate;

forming  $\text{Al}_y\text{Ga}_{1-y}\text{N}/\text{GaN}$  short period superlattice (SPS) layers on the GaN-based buffer layer in a sandwich structure of upper and lower parts having an undoped GaN layer or an indium-doped GaN layer interposed therebetween (~~Here,  $0 \leq y \leq 1$~~ ) (where  $0 < y \leq 1$ );

forming a first electrode layer of an  $\text{n}^+$ -GaN layer containing a high concentration of dopants, on the upper  $\text{Al}_y\text{Ga}_{1-y}\text{N}/\text{GaN}$  SPS layer;

forming an active layer on the first electrode layer; and

forming a second electrode layer of  $[[\text{an}]]$  a p-GaN layer on the active layer.

13. (Original) The fabrication method of claim 12, further comprising the step of forming an n-GaN layer containing a low concentration of dopants, between the first electrode layer of the  $\text{n}^+$ -GaN layer and the active layer.

14. (Original) The fabrication method of claim 12, wherein the GaN-based buffer layer is, using a MOCVD equipment, grown-up to have a 50-800 Å thickness at a 500-800 °C temperature and in an atmosphere having H<sub>2</sub> and N<sub>2</sub> carrier gases supplied while having TMGa, TMI<sub>n</sub>, TMAI source gas introduced and simultaneously having NH<sub>3</sub> gas introduced.

15. (Original) The fabrication method of claim 12, wherein the GaN-based buffer layer is grown-up with a 5-300 μmol/min flow rate of the TMGa, TMI<sub>n</sub>, TMAI source gas and a 100-700 torr growth pressure.

16. (Currently Amended) The fabrication method of claim 12, wherein the GaN-based buffer layer has a triple-structured  $\text{Al}_{1-y}\text{In}_y\text{Ga}_{1-x-y}\text{N}/\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$   $\text{Al}_y\text{In}_x\text{Ga}_{1-(x+y)}\text{N}/\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$  laminated (~~Here,~~ where  $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ), a double-structured  $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$  laminated (~~Here,~~ where  $0 \leq x \leq 1$ ), or a super-lattice-structured (SLS)  $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$  laminated (~~Here,~~ where  $0 \leq x \leq 1$ ).

17. (Original) The fabrication method of claim 12, further comprising the step of forming an undoped GaN layer or an indium-doped GaN layer on the GaN-based buffer layer.

18. (Original) The fabrication method of claim 12, wherein the dopant concentration of the n<sup>+</sup>-GaN layer is more than  $1 \times 10^{18}/\text{cm}^3$ .

19. (Original) The fabrication method of claim 13, wherein the dopant concentration of the n-GaN layer is  $1 \times 10^{17}/\text{cm}^3$ .

20. (Original) The fabrication method of claim 13, wherein the n-GaN layer is formed with a semi-insulating layer.